NON-PUBLIC?: N
ACCESSION #: 9209030223
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Calvert Cliffs Unit 2 PAGE: 1 OF 8

DOCKET NUMBER: 05000318

TITLE: Manual Plant Trip Resulting From Inadvertent Relay Actuation
EVENT DATE: 08/01/92 LER #: 92-005-00 REPORT DATE: 08/31/92

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: R. E. Franke TELEPHONE: (410) 260-2060

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

At 2009, August 1, 1992, a loss of condensate and feed system pumps occurred at Calvert Cliffs Unit 2 while at 100 percent power. A non-licensed plant operator caused a circuit breaker relay to operate, tripping the feeder breaker and causing the trip. At 2010, Plant operators manually tripped the reactor and stabilized the plant by 2021. An Auxiliary Feed Actuation System actuation was experienced during the post-trip transient.

Incomplete corrective actions from a 1985 event appear to have contributed to this trip. Additionally, the conditions of the breaker cubicle door and its affected relay contributed significantly to the event.

As corrective action, temporary signs were hung on similar feeder breakers and appropriate personnel were informed. Planned actions include procedure changes to address the primary and contributory causes,

training, door functional checks, and permanent cubicle-door caution signs.

END OF ABSTRACT

I. DESCRIPTION OF EVENT

At 2009, August 1, 1992, a loss of condensate and feed system pumps occurred at Calvert Cliffs Unit 2. At the time of the event, the plant was operating at 100 percent power. Plant operators manually tripped the unit in response to decreasing steam-generator (SG) levels. Control Room Operators then began plant-recovery measures and stabilized the plant at 2021. An Auxiliary Feed Actuation System (AFAS) START signal started Auxiliary Feed Water (AFW) Pump No. 23 during the post-trip transient. This is discussed in Section III, ANALYSIS.

The No. 23 bus (4kV) running condensate system pumps were de-energized when its feeder breaker tripped open. A non-licensed plant operator had found the breaker cubicle door not fully shut. The door latch had a material-deficiency tag hanging on it that noted the door as difficult to shut. The operator closed the door once and immediately noticed circuit breakers tripping. When the condensate pumps coasted down, the feed pumps lost suction pressure and tripped.

Licensed Operators observed lost-bus indications in the Control Room and diagnosed decreasing SC levels as a loss of feed water. They manually tripped the unit at 2010.

The 4kV System Engineer and Assistant General Supervisor of Electrical Maintenance troubleshot the problem the next morning. Their testing revealed that a breaker overcurrent relay mechanically operated when the operator shut the door. We believe shutting the door against its malfunctioning latch resulted in jarring the door-mounted relay.

The electromagnetic induction relay described in this report is a General Electric 151 device, Model Number 12IAC66K8A. Figure 1 diagrams a typical relay circuit. The line-current transformer produces an induction-coil signal current. When the signal current becomes excessive, the induction coil drives a mechanical device to close the induction-disc contact, completing the circuit. The energized seal-in coil
closes its contact to maintain the circuit energized long enough for the trip coil to trip the breaker.

Figure 2 illustrates the seal-in unit. When energized, the seal-in coil and core generate an electromagnetic force that raises the leaf-spring lever arm, on which the seal-in contacts are mounted. This electromagnetic force is also sufficient to allow the mechanism to lift and latch the target indicator. The target allows an operator to check proper relay operation.

With a latched target indicator, a jarred relay may have the necessary force to raise the leaf-spring mechanism and self-actuate. Calibrated force-gauge measurements show a force of 0.02 pounds to lift and latch a target. Once a target latches, any slight force can relift the light-weight mechanism.

We believe the feeder-breaker relay target remained latched from some unknown, prior activity. Shutting the door against its malfunctioning latch jolted the relay which mechanically actuated, causing the breaker to trip.

II. CAUSE OF EVENT

A similar event occurred in 1985 in which a maintenance technician caused a sensitive-relay trip. As corrective action, we informed all Operators and Electrical and Controls (E&C) maintenance personnel of the event. This heightened their awareness of the potential consequences of disturbing operating-equipment cabinets. We documented this prior event in Licensee Event Report (LER) 318/85-002.

Incomplete corrective action taken in 1985 appears to have contributed towards this event. Procedure changes and permanent caution signs should also have been implemented. We did, however, include precautions in E&C Standard Procedures to reinforce care in handling cubicle doors.

The door latch's material condition and latched trip flag contributed significantly to this event. The door latch problem and latched trip flag combined to reduce the amount of door shutting force required to self-actuate the relay. The importance of these two elements was not fully appreciated until this event. The 1985 event was sufficiently unique that this event was not foreseen.

III. ANALYSIS OF EVENT

This event is reportable under 10CFR50.73(a)(2)(iv). The event resulted in both manual and automatic operation of the Reactor Protection and Engineered Safety Features Actuation Systems respectively.

Automatic systems protect Calvert Cliffs Units 1 and 2 against Loss of Feed events from 100 percent power, The Updated Final Safety Analysis Report Chapter 14 safety analysis considers three scenarios. The first is a Loss of Feed with no AFW flow for 10 minutes. The second and third involve automatic AFW start with and without loss of AC following Turbine trip. The automatic features protect Calvert Cliffs for all three. Prompt operator action prevented the need

for any such automatic action. Plant operators immediately tripped the reactor and returned the plant to a stable status in about 10 minutes. There was no impact on public health and safety.

Two seconds after the trip, an AFAS START signal started the No. 23 motor-driven AFW pump. We have experienced post-trip AFAS START signals before at Calvert Cliffs Unit 2. Plant operators understand and anticipate these post-trip AFAS actuations. They are a consequence of the current AFAS design.

Post-trip SG pressure and flow transients affect the SG wide-range level instruments, resulting in false low-level signals and AFAS STARTS. This problem was previously reported in LER 318/91-004. The Unit 2 AFAS START time-delay modification described in the LER has not been completed due to required design changes. We plan no future AFAS START corrective actions beyond those described in LER 318/91-004.

IV. CORRECTIVE ACTIONS

Immediate Corrective Actions

A. Operators manually tripped and stabilized the plant in accordance with established plant procedures.

B. Technicians inspected the affected buswork for damage and re-energized the bus from an alternative feeder breaker.

C. Technicians inspected the affected relay for damage and repaired the malfunctioning door latch. All similarly malfunctioning door latches were repaired.

D. Troubleshooting confirmed the component failure mode as a jolted relay.

E. Personnel placed temporary caution signs on all similar feeder-

breaker doors.

F. Supervision quickly informed Operations and appropriate Maintenance personnel of the event's causes and corrective actions. They now know what to check before shutting cubicle doors.

Actions to Prevent Recurrence:

G. Operations will reinforce long-term awareness by making a procedure change to Calvert Cliffs Instruction 140, Conduct of Operations. This change will formalize the watchstander requirement to reset relay flags before shutting cubicle doors.

They will make a similar change to the 4kV System Operating Instruction.

H. The Operations Training Unit will review this procedure change and the events with personnel to be sure both licensed and non-licensed shift personnel are familiar with them. E&C Maintenance Training - also will review the events with maintenance personnel.

I. Maintenance will place a door functional check in periodic breaker inspection procedure FTE-51. They will also change E&C Standard Procedure 20 to require trip-flag resetting.

J. Permanent caution signs will be installed on 4kV breaker cubicle doors.

V. ADDITIONAL INFORMATION

A. Components described in this report:

IEEE 803a/83 IEEE 805/84
Component or System Funct. Ident. System Code

Feeder Breaker 52 EA
Overcurrent Relay 51 EA
AFAS N.A. BA
Condensate Pump P SD
Feed Pump P SJ
Power Dist. Bus BU EA
AFW Pump P BA

Steam Generator SG N.A.
Current Transformer XCT N.A.
Coil CL N.A.
Turbine TRB TA

B. Previous Similar Events.

We reported one similar event as LER 318/85-002. This LER is described under Section III, CAUSE OF EVENT.

Figure 1 "Typical Relay Circuit" omitted.

Figure 2 "Seal-in Unit" omitted.

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R. E. DENTON
GENERAL MANAGER
CALVERT CLIFFS August 31, 1992

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit No. 1 or 2; Docket No. 50-317 or 318;
License No. DPR 53 or 69
Licensee Event Report 92-005

Gentlemen:

The attached report is being sent to you as required under 10CFR50.73 guidelines. Should you have any questions regarding this report, we will

be pleased to discuss them with you.

Very truly yours,

RED/REF/bjd
Attachment

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
R. A. Capra, NRC
D. G. McDonald, Jr., NRC
T. T. Martin, NRC

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